Assiut University
Faculty of Engineering
May – 2015

Final Exam

2nd Year Architect. Eng.
Course: Air Conditioning Part
Time: 1 Hour, Marks: 30

[Quality matter: This exam. measures ILOs a1 & a4, a5, a8, b2 & b3, ,b4 & b5.]

Psychrometric chart with student is allowed

Try the following questions.

Question no. 1 (5 points).

Define the following:

Coefficient of performance, Relative humidity – Latent heat – Sensible heat factor – Dew point temperature

Question no. 2 (4 points).

A 8 kg/s of an air stream at 10° C and 50% RH is mixed with 2 kg/s of an air stream at 35°C DBT and 0.014 kg w.v/kg d.a humidity ratio . find the DPT of the mixture.

Question no. 3 (6 points).

A 2 kg/s of air stream at 8 °C DBT and 5 °C WBT is heated sensibly up to 24°C DBT, then a 20 g w.v./s of moisture is added in a humidifying process. Calculate the sensible load and sensible heat factor.

Question no 4 (6 points).

A 60 cmm of moist air at a 32 °C DBT and 22 °C WBT enters a cooling and a dehumidifying coil. If it is desired that the air leaves the coil at 18 °C DBT and 16 °C WBT, determine the following:

a) the effective surface temperature of the coil

b) coil bypass factor

c) the coil cooling capacity

Question no. 5 (10 points).

The space shown is to be conditioned has the following:

One storey space of height 4 m, west glass area 12 m^2 door 2.0mx 1.5 m

At the hour of calculation you have:

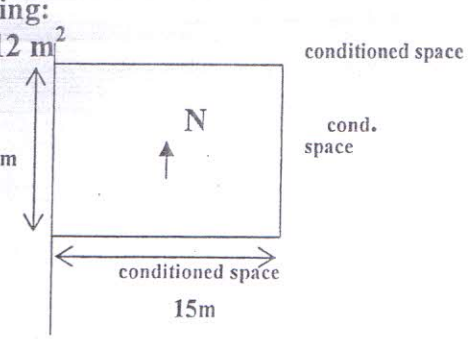
heat transmission through glass =45 W/m^2

solar heat gain through glass = 460 W/m^2

CLF for solar heat gain 0.7

U for west wall 3.5 W/m^2. °C and for roof of 2.5 W/m^2. °C.

$CLTD_{corr}$ for west wall 13° C, and for roof 17° C.



Outside design conditions: 40 C DBT and 27° C WBT, Inside design conditions 25 °C and 50 % R.H., lighting 25 W/m^2 , CLF = 0.7, Occupancy 25 persons, sensible heat gain per person 75 W and latent heat gain per person 65 W, CLF = 0.6

Ventilation air 12 m^3/hr per person and infiltration air 6 m^3/min.

Assume any missing data, calculate space cooling load.

Best wishes, Examiners: Prof. Ibrahim .M. Ismail + "The committee"